VAA-Weekly-Progress

10/16-10/22

Context

- Last week, we met to complete and submit our project's abstract

- We continued our work on replicating MMPose accuracy and training with subsets of antelope

- With our finalized keypoint definitions and occlusion handling, we could proceed to annotate several antelope images on Label Studio

Agenda and Goals

- Finalized project abstract
- Replication of MMPose accuracy shown with TensorBoard
- Training AP-10k antelope subset on RTMPose
- Annotations of antelope images on Label Studio

Abstract

Our research explores two major factors that impact the generalizability of keypoint estimation models to more difficult data. Specifically, we focus on in-the-wild antelope images captured from motion-triggered camera traps in Senegal, West Africa.

The first major factor we will focus on is how our model's performance changes based on varied subsets of training data. To do so, we leverage the AP-10k dataset to explore different training strategies, such as whether training on a small subset of visually similar species helps the model generalize better.

Our second area of exploration is testing our keypoint labeling scheme, which is more rigorous than the labeling scheme of the AP10k dataset. Using our data, we created keypoint labels based on several different definitions – some are visually distinct, while others are more biologically correct. By training and testing with these different keypoint definitions, we want to explore what kind of keypoint definition helps the model generalize better. Our results improve keypoint detection for animals and, in a broader sense, contribute to the abundance estimation of animals in the wild.

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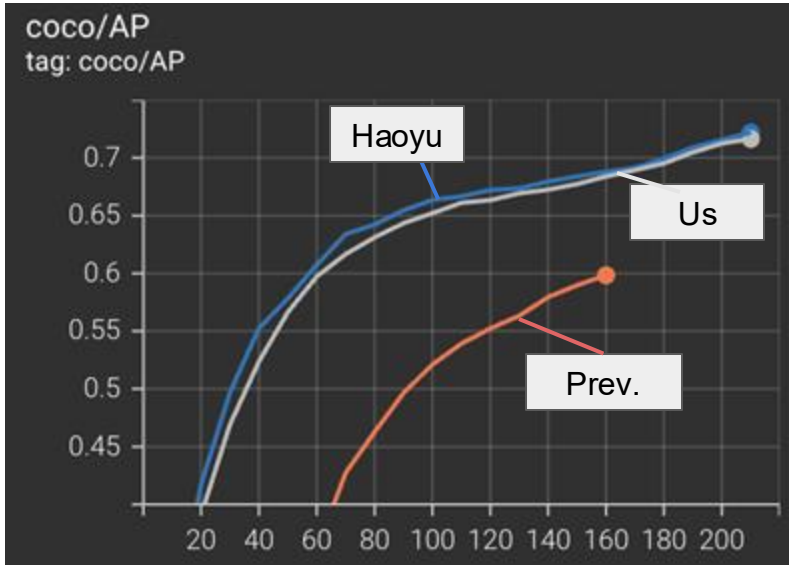
Replicating MMPose Accuracy

*Specify –work-dir ‘./training_logs’ at the end of a training commands

```
vip24_shared@deadcat:~/mmposetensorboard --logdir='./training_logs'
```



	Results on DeadCat	MMPose
AP	0.716	0.722
AP50	0.946	0.939
AP75	0.792	0.788
AP M	0.579	0.569
AP L	0.718	0.728

Antelope Subset Training

140 training images

40 testing images

20 validation images

Rtmpose + Rtmpose on Ap10k

▶ AP-10K (NeurIPS'2021)

Results on AP-10K validation set

Arch	Input Size	AP	AP^{50}	AP^{75}	AP^{M}	AP^{L}	ckpt	log
rtmpose-m	256x256	0.722	0.939	0.788	0.569	0.728	ckpt	log

"coco/AP": 0.7365, "coco/AP .5": 0.9074, "coco/AP .75": 0.7969, "coco/AP (M)": -1.0, "coco/AP (L)": 0.7365

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Annotations

Image Timings:

Medha: 3:24, 2:17, 1:51, 1:25

Josh: 11:23, 5:58, 3:57, 2:58

Parth: 5:28, 4:32, 3:55, 2:31

Comments:

Medha: Confusion on inner vs outer shoulder, should shoulder be estimated horizontally or where it leaves the body?

Josh: Confusion on paw locations, root of tail inconsistencies.

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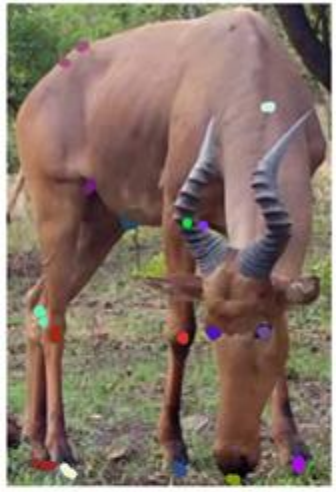
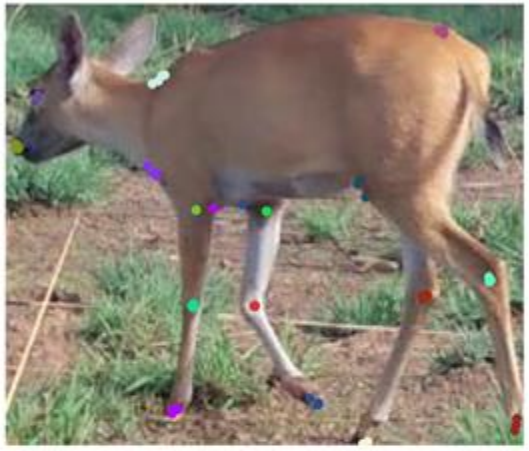
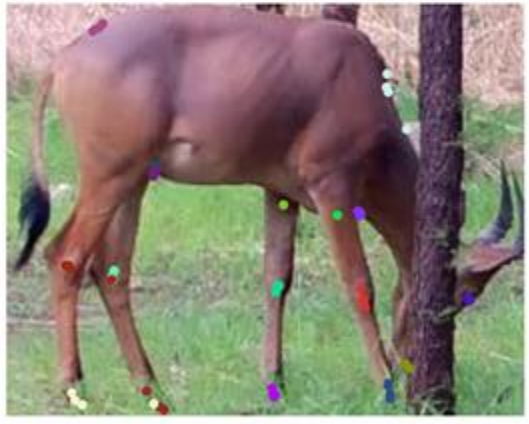
New Labeling Scheme







Keypoints

- Back Left Knee
- Back Left Paw
- Front Left Knee
- Front Left Paw
- Front Right Knee
- Front Right Paw
- Left Eye
- Left Hip
- Left Shoulder
- Nose
- Right Back Knee
- Right Back Paw
- Right Eye
- Right Hip
- Right Shoulder
- Root of Tail
- Throat
- Wither

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Next Steps

- Training AP-10k Bovidae-family subset on RTMPose
- Exploring similarity between animal species(visual and taxonomical)
  - Look into avenues for computing the visual similarity between animal species
- Brainstorming downstream applications of project

Personal Progress

Shaan

- Finally managed to replicate expected results with RTMPose on AP10K
- Organized tensorboard runs in DeadCat
- Updated Label-Studio config with new labeling scheme and put 4 sample images in a project for the team to label

Medha

- Worked on creating rough draft of abstract and then helped adjust with the team
- Trained RTMPose on antelope subset of AP10K
  - Need to understand the metrics used for evaluation and figure out how to test model on images
- Annotated images based on labeling instructions

Josh

- Helped write and submit Abstract

- Began labeling images using new keypoint definitions

- Began looking into how to determine the visual similarity between animal species

Parth

- Helped edit and submitted the abstract on OUR Connect
- Annotated images based on labeling instructions
- Starting to look into ways of identifying animal similarity

Armaan

-Helped write and submit abstract

- Labeled images using new keypoint definitions

- Looked into determining visual similarity between animal species

Claire

- Helped with abstract
- Annotated images of antelope on Label Studio